THE FOURTH GRADE

The fourth grade marks the beginning of a renaissance, as it were, for the normal child. There come, upon his mental and spiritual horizon at the age of nine and ten, the dim outlines of a new vision. World consciousness is taking form. Because of this consciousness, there is a desire to stretch out—figuratively speaking, with both hands and feet—to get in touch with something new. To feed and strengthen these yearnings, in which lies so much mental and spiritual force, if but shaped aright, is the purpose of the fourth-grade curriculum.

For this reason, Greek history, with its wealth of beauty in art, literature, and government, and world geopraphy, with its multitudinous avenues of information, are made in this school vital parts of the year's work. The more immediate need of expansive fellowship is met by the school garden and grade pets. Reading, writing, literature, English, arithmetic, art, clay, manual training, and eurythmics, are all closely correlated with these major interests.

Geography, gardening, and the care of pets, are the studies which legitimately comprise the science work during the year. As much of this study as is possible is made concrete through personal experience in experimentation. It is with the experimental phase only of the science work that this outline deals. The other phase, that gained from second-hand information, is outlined very briefly. This experimental work is so closely interwoven with the other work of the curriculum that to formulate it into a detached outline, as is here presented, is to give a somewhat false impression. It is as if one were to pluck the aigrettes from the heron, and, holding them forth, to say: "Behold the plumage of this bird."

However, such an outline will arrange itself under the three divisions:

I. Problems arising from world geography.
II. Problems arising from the making of a grade garden.
III. Problems arising from the care of pets.

GEOGRAPHY

No textbook is used in the geography work of this grade. All information necessary is gained from reference books. (See list at end

of article.) Imaginary journeys in search of food furnish the motive for study. Cacao and meat are the two types selected,—they are taken because of their direct appeal and their wide application. Through cacao the tropical regions are covered, and through meat the temperate and arctic. Physical, locational, mathematical and anthropo-geographic points may well be developed from these two seemingly inadequate types. A large, loose-leafed notebook, of rough gray paper, is made by each child. This is the *Travel Book,* and in it are kept records of the trips, such as maps, time-tables, pictures of railroads, ships, peoples, homes, products, etc.

The first journey starts with the search for cacao. Preparations are made for the trip from Chicago to New York. The Great White Fleet steamer is used from New York to Jamaica. Observations are noted along the route and after arrival. A day's visit to a cacao plantation in Jamaica is made. Full observations of the planting, growth, gathering, and preparing for shipment of the cacao beans are noted. At this point a real trip is taken to the Garfield Park Conservatory, to see a real cacao-tree. A second real trip is then taken to the Bunte candy factory, where are seen the full processes of making cocoa and chocolate. The amount of cacao beans used by this factory raises the question, "Does Jamaica supply the world with cacao?" Other regions similar to Jamaica in climate are searched for. The journey lengthens out through the Panama Canal, to Ecuador, across the Andes, down the Amazon, across the Atlantic, through central Africa, across the Indian ocean to southeastern Asia and the East Indies. Position, climate, surface, differing products, people, and routes of travel, are all developed through this study. Several actual trips are taken to the Lincoln Park Zoo to see the animals that are met with on the journeys.

Several big questions arise in this work that only the laboratory can answer adequately. The following pages give the questions and the laboratory work involved:

In the journey from New York to Jamaica, a child asked, "If we are out of sight of land, how does the captain know the directions?" A second pupil answered, "The compass tells him." The first child replied, "But what is the compass, really?"

Experiments.—The Compass.—Magnetizing a needle and floating it on water. Observing the direction which a suspended magnetized bar takes. Making a simple electro-magnet. Noting effect of electric current on the compass. Using the compass to find directions in the room. Noting effect of iron in the room on the compass. Locating magnetic poles on world-map.

Having arrived at Jamaica, a pupil asked, "Why is it warmer here than in Chicago?" A second child answered, "Jamaica is nearer the equator." But the first child retorted, "I don't see what that has to do with it, besides, I don't see why there are summer and winter anyway—the sun is shining just the same."

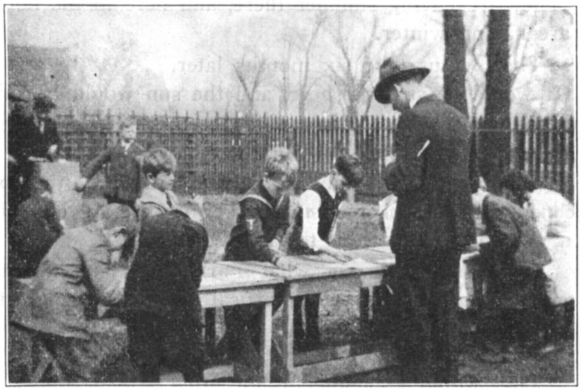
The work done to answer this question is given here in rather full detail, since its solving took many weeks and proved to have some rather wide correlations.

Experiment.—Changing Seasons and Light Distribution.—The school room was darkened, and with a globe, a stereopticon spot-light, a twilight circle, and a yardstick, the differing positions of the earth, with relation to the vertical ray of the sun, were worked out. The distribution of light, with the varying length of day and night, was observed.

Several lessons were devoted to the summing up of the results of this experiment. Drawings were made of the earth in its different positions. Names were given to the four important positions: spring, summer, autumn, winter. The words *solstice* and *equinox* were introduced.

Then the question was asked by the teacher, "You have *made the statement* that the vertical ray from the sun does strike the earth at different places during the year. How can you *prove* that this vertical ray does change?" From the discussion that followed, it was discovered that shadows changed length and direction with changing position of the light; hence, difference in the length of shadows would prove the changing position of the vertical ray. Thereupon, it was decided that a shadow-record be kept. The plans for a shadow-board were worked out by the class, and the board was made in the manual-training shop by one member of the class.

It was then found necessary to find true north on the school grounds, so that the board could be rightly placed—also, it was necessary to know the difference between standard and sun noon, as the shadows were to be measured at 9 A. M., noon, and 3:00 P. M. Accordingly, each child, with a pin, a piece of paper, and a sharp pencil, recorded the shadows of the pin from 11:30 A. M. to 12:20 P. M. This work was done on long tables in the school garden. True north was found by the shortest shadow; the difference between the time indicated by the watch, at the taking of this shadow, and of true noon, gave the difference in minutes between standard and sun time. True north was compared with compass north, and the magnetic declination of Chicago was found.



FINDING TRUE NORTH

The shadow-board was placed according to directions, and records of the shadows at 9:00 A. M., noon, and 3:00 P. M., were made Mondays, Wednesdays, and Fridays on the paper plates.

The question then developed: If we can prove that the length of a shadow really changes in Chicago, how can we get evidence that it is at the same time changing in other places? The following stenographic report of the lesson shows the result of this inquiry.

CLASS LESSON

January 16, 1918

Teacher. We worked out a very satisfactory explanation for ourselves as to the cause of winter and summer; that is, satisfactory to most of us. A few were absent and may not understand it. Can anyone give, in a very few words, just what the cause of our winter and summer is?

Parke. Well, in winter the axis, you know, is just opposite in the south to what it is in the north, when they have summer down there. That is because *(goes to the board and draws a diagram)*, here is the sun, and here is the earth, and there is the axis, and you see, there is North America. And here, the direct ray of the sun hits the southernmost part of the earth—that is, throwing most of the light and heat towards the southern part of the earth. That leaves the north without so much heat. Here the direct ray hits the Tropic of Capricorn.

Teacher. Can you tell, then, where the sun's rays are hitting the earth directly now?

Parke. Near the Tropic of Capricorn.

Teacher. Then, what season are they having there?

Parke. They are having summer there, and here in the northern hemisphere we are having winter.

Teacher. Then let us take six months later.

Parke. It would be summer here, and the sun would be shining more on the northern hemisphere.

Teacher. And what causes the difference?

Parke. In the winter, in the northern hemisphere, the axis of the earth is inclined away from the sun. The north pole is inclined away from the sun, and the south pole is toward the sun.

Teacher. Some, not believing what Parke has said, might say this: "How can you prove to me that the vertical ray does change its position, as Parke has said it does?"

Eugene. By a drawing.

Teacher. That would explain, but not prove.

Marion. I suppose most people would think the axis pointed in the same direction. You would have to show that by going around the sun, keeping the axis pointing the same way, using something to represent the sun and something else to represent the earth.

Teacher. That would be an illustration, not a proof.

Marion. We could use the shadow-plate.

Teacher. How would that prove it?

Marion. The shadow would show the way the direct ray moves.

Teacher. But we've got to have a definite proof that the shadow actually changes its position in the south as well as the north.

Eugene. We could take a shadow-plate and ask someone to tell what it was on the same day in some other country.

Teacher. How could we get a shadow-record that would represent, say, the southern solstice?

Marion. If we could get word from that place. I don't see just how we can do it.

Eugene. Send a letter to one of the men who takes care of the weather, and see what the weather is down there, and ask them to record it on a piece of paper or something, and then in a month send it to us because we are studying about it.

Teacher. That suggestion is excellent. But has anybody a criticism about using the weather-man?

Jane. My father learns about things by calling up *The Chicago Tribune,* because they know most of the things like that—because they know the weather-men at different places.

Teacher. That would be still getting the news from the weather-man. Is there any place where people might be interested in what we are doing?

John. I know some people in California.

Nancy. My aunt lives down in Houston, and if I wrote a letter to her, she could find out for us. We could send a night letter.

Richard. Why couldn't we write to some schools some place and tell them what we are doing, and ask them to make a shadow-record and send it to us?

Teacher. Excellent suggestion. Those boys and girls might be just as much interested in recording the shadow as you are. If we could get in communication with some schools, what are the places that we should hear from, if we are going to get the real proof?

Austin. I think we ought to send to Venezuela, or to Argentine.

Teacher. Why would you select a place down there?

Austin. Because it is south of the Tropic of Capricorn.

Teacher. Let us make a list of the these places *(writes on the board as pupils suggest).*

Benny. One at the Tropic of Capricorn.

Pauline. At the equator.

Letha. At the Tropic of Cancer.

Howard. Between the Tropic of Cancer and the equator.

Alice. North of the Tropic of Cancer.

Florence. That could be here in Chicago.

Teacher. Very good. Now what shall we do to get cities on these important lines?

Alice. Use our maps. *(Many hands up approved the suggestion. Longman's School Atlas opened.)*

Teacher. What map shall we use first?

James. North America.

Teacher. Who can give us the page in the *Atlas?*

Carl. On page 9.

Teacher. How can you recognize the Tropic of Cancer?

Parke. By the dotted line. It goes through Cuba and Mexico and quite close to San Domingo.

Teacher. Cuba is one island in what big group of islands?

Nancy. The West Indies.

Teacher. Is there any large city in the West Indies that we might get into communication with?

Parke. Havana, in Cuba.

Teacher. Now for a city on the equator. Does the equator pass through North America?

Miriam. No, through South America.

Teacher. Who can give us the page for the map of South America?

Jane. Page 18.

Teacher. How can we recognize the equator on the map?

Richard. There is a line.

Teacher. What kind of line?

Pauline. Continuous.

Frederick. On the left hand side of the line it says "Equator."

Teacher. Follow this line with your finger across the map, and see if you can find some city that it would be easy to get in communication with.

James. Quito.

Teacher. I must tell you about Quito. It is way up in the mountains. It is very difficult to get to Quito. Isn't there some city on the eastern coast?

John. Para, in Brazil—just a little south of the equator.

Teacher. Now for the fourth city, near the Tropic of Capricorn.

Elizabeth. Santiago.

Teacher. Suppose we continue on the eastern coast of South America, because it is easier to get into communication with places on that side, and the only cities that would be willing to do this work would be large cities. How are the large cities marked on the map?

Miriam. They have a little square.

Alice. And large print.

Teacher. Who has a city near the Tropic of Capricorn?

Warwick. Rio de Janeiro.

Teacher. Locate Rio.

Warwick. Southeastern Brazil.

Teacher. We must have five places, you said. We have Chicago, north of the Tropic of Cancer; Havana, on the Tropic of Cancer; Para, on the equator; Rio, on the Tropic of Capricorn; and now we must have a city as far south of the Tropic of Capricorn as Chicago is north of the Tropic of Cancer.

Frederick. Buenos Aires, in northeastern Argentine.

Teacher. If we can get a shadow-plate record from each one of these cities, and compare their shadows on the same day with our shadow on that day, would we have a proof that no one could question?

John. Yes.

Teacher. What do you think our next step should be?

Alice. Write a letter and get the name of the head of education in these towns if we can.

Teacher. We will proceed tomorrow, then, to organize some plan by which we can get these letters started as soon as possible.

Several English lessons were devoted to the compiling of the letter to be sent. The following is the letter:

February 26, 1918.

Superintendent of Schools, Para,
State of Para, Brazil.

Dear Sir:

We, the Fourth Grade of the Francis W. Parker School, are studying about the revolution of the earth. We want to prove that the direct ray does change its position. We think we can prove it with your help. We have made a shadow-board and are going to keep a record of the direction of the shadow here. If we could get such a record from Para, we could see the difference in the direction of the shadow.

The shadow-board is 18 inches square and 1 inch thick; it has a stick 2 inches long and ¼ inch in diameter, standing up in the middle of the board.

We have cut manila paper 18 inches square with a hole ⅜ inch in diameter in the center. We slip this paper over the stick on to the board. Then, on this paper, we mark the shadows Mondays, Wednesdays, and

Fridays, at 9 A. M.; noon; and 3. P. M. On each line we mark the date and time. When the paper is full of lines we put on a new sheet.

If some school in Para could keep a record for March, April, and May, and send us the record at the end of each month, we would then have some *real* information about the changing of the sun's position. We should be very glad to send our records if you cared to have them.

Hoping, very much indeed, that one of your schools may be able to help us, we remain

Yours sincerely,

FOURTH GRADE.

Copies of this letter were sent to Havana, Cuba; Kingston, Jamaica; Para and Rio de Janeiro, Brazil; Buenos Aires, Argentine. Three replies have been received at the writing of this report. The results of the experiment are eagerly awaited.

The manual-training teacher followed up this shadow-work with the making of pocket sun-dials and various contrivances for telling time. His report of the problem follows.

A STUDY OF TIMEKEEPING DEVICES

In connection with the science and geography work of the fourth grade some time in the shop was devoted by the boys of the grade to a study of timekeepers.

The movement of the earth about the sun with the attention on the lengthening of the shadow cast by the sun could not very well be discussed without some reference to the use which has been made of this fact in various times and by various peoples as a means of telling time. This gave us a point of departure and reference was made to the use of the sun-dial in our own country in colonial days. The comparison between the present and the past, between the watches and the clocks of today and the methods of earlier times offered a very profitable field for investigation and study.

In the discussion which arose it was found that nearly all of the boys knew about sun-dials. The sun-dial on the school grounds was familiar to all, and many had seen such primitive clocks in other places. The fact that in the time of Washington the sun-dial was still the common means of telling time was a fact which one of the pupils brought out through information which he had gathered in his reading. In Roosevelt's *Winning of the West* was found a picture of a pocket sun-dial such as Washington probably carried when on his sur-

veying trips. An attempt was made to duplicate this, and each of the boys made one and tested it and found it would tell time approximately correctly. Comparison of the sun-dial with the watches and clocks of today brought out the fact that while watches would tell time equally well, no matter where the watch might be, it was not so with the sun-dials, which must be made for a definite latitude. The dial could be used to tell time at any point on an east and west line, but carrying it farther north or south of the given latitude would destroy its usefulness. No attempt was made to go into the reasons for this in detail, merely calling attention to the fact that the nearer the equator a person happened to be at certain times of the year, the more nearly would the sun be directly overhead. This would necessitate a difference in the slant of the gnomon or pointer of the sun-dial, and the angle of the gnomon would be the same as the latitude of the place where the dial was to be used. This meant looking up the latitude of Chicago, which was found by consulting an atlas in the library.

Attention was called to the fact that experts were needed at the time sun-dials were in common use, who could lay out very accurately the various angles needed, and that these men were called *dialers* and held a position similar to our watchmakers of today.

Other forms of timekeepers discussed, to most of which the pupils had found reference in their reading, were: time-candles; tarred string which was knotted at intervals, these intervals marking the time when the string was lighted or slowly smoldered; hour glasses; and water-clocks. A list of these was made and certain of the pupils volunteered to make some of the forms discussed.

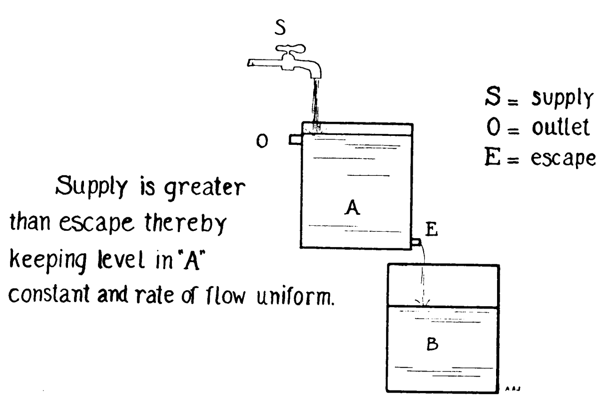
The water-clock offered an opportunity to trace the evolution of our modern clock and also provided a field for invention on the part of the class in the realm of physics and mechanics. A brief description of the method by which this was worked out might prove of interest.

1. The Malay islanders used a cocoanut shell to tell time. This had a very small hole in it and when it was placed in a vessel of water it gradually filled and sank, thus marking an interval of time. It was then emptied and set afloat again. Here the science involved was that of water pressure. An interesting class discussion as to the rate at which it would fill ensued, some pupils contending that as the cocoanut filled with water, the speed with which it sank would be increased, owing to the increased amount of water which it contained. The fact that the water which entered the cocoanut when it was nearly full

would have to push against all the water which it then contained meant that the rate at which it filled would be slowed down. When the cocoanut was first put to float, the water entering the empty shell would merely have to displace the air and would therefore enter more readily. This would also be increased by the added weight of the shell, which at that time was considerably above water. This weight, bearing down on the surface of the water, would naturally become less as the shell became submerged in the water. These were facts which various pupils brought out in the discussion, and which one boy proved to his satisfaction by making an experiment.

2. The Hindus improved upon this by using a copper bowl. The shape was similar to that of the cocoanut, but the added advantage lay in the fact that bowls could all be made uniform, so that a standard unit could be preserved by several people. The same objection as in the case of the cocoanut shell still held true: namely, that the irregular shape of the vessel and the lack of a uniform rate made it impossible to divide the unit into equal periods of measurement.

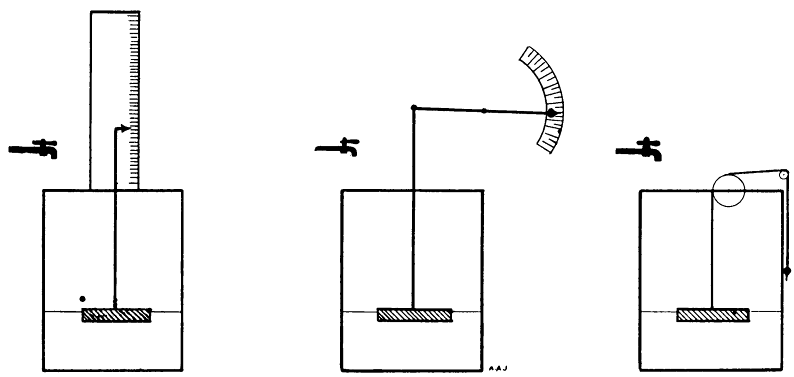
3. The Chinese water-clock was an improvement upon these two methods in that the vessel was cylindrical so that, by placing one vessel above the other and allowing the water from the first to flow into the second at a constant rate of speed, it was possible to divide the straight sides of the cylinder into as many equal parts as desired and thus mark off uniform divisions of time. The pressure was kept constant in the following manner.



At this point in the discussion, the class was asked to give some attention to devising means by which the amount of water that had

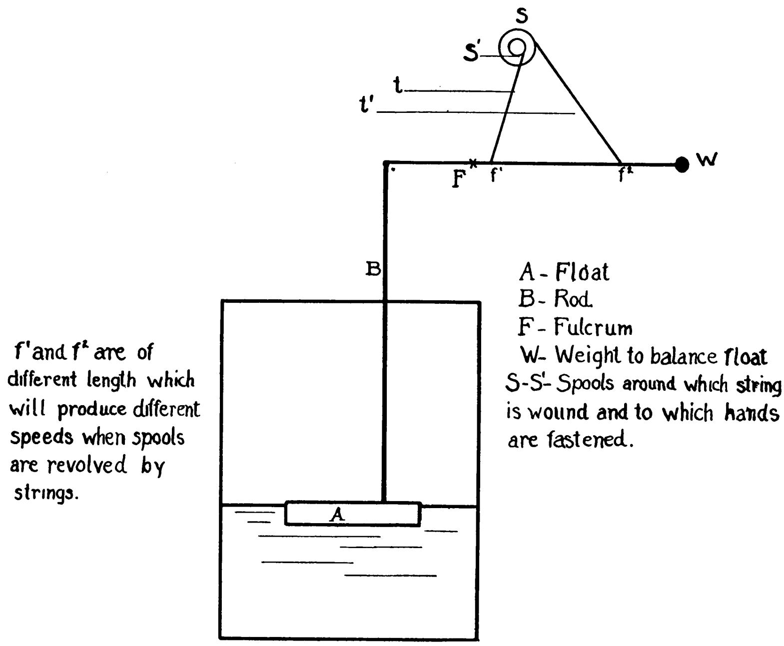
flowed into the lower vessel could be indicated outside of the vessel. Attention was called to the fact that our clocks have dials on the outside by which we can readily see what period of time has passed without the necessity of opening up the clock. The following are some of the "inventions" of the various members of the class, some of which show considerable ingenuity.

In this discussion the fact was brought out that the pressure of the water was the power by which the various indicators were made to move and that the size of the opening through which the water flowed was the escapement which determined the rate of speed. Some of the devices planned were adaptations of devices seen elsewhere, such



as the oil-gage familiar on automobiles, and the water-tank seen along the railroad. Others were attempts to make the water, by means of the power which was stored in it, move hands in somewhat the same manner as the hands of our modern clocks move. The following drawing shows the attempt of one boy to solve this problem in the water-clock.

The familiarity displayed with such devices as levers, floats, weights and the laws of gravity shows the interest manifest in these subjects and proves the need of more work involving elementary physics in these early grades, especially when this work is laden with a human interest, developed through their geography and history work and centered around some simple device, connected with the common every-day life of people. Carried on in this way and removed as far as possible from the realm of the abstract *experiment* of the science laboratory familiar to all students of secondary education, this science work can not help but have a vital place in the course of study of the elementary school.



As in much of our work, this study is to be presented to the rest of the school in the form of a morning exercise. Plans for this have not as yet been completed. Some suggestions which the class has made as to the form of this exercise are rather interesting, especially the suggestion that pupils taking part wear costumes of the people described in the exercise, such as the Hindus, Malays, Chinese, and early Colonials. Also the suggestion that *Father Time* have a conspicuous part, perhaps as announcer.

At the present time, March 22nd, the study is not completed, but it is the intention to trace the evolution of the clock as we know it today from these early beginnings and attempts to divide the day into parts of equal length. This can not be done without a certain amount of comparison between the value placed upon time in civilized and in uncivilized communities. This ranges from that of the lowest form of civilization, in which distinction is made merely between night and day or light and darkness, up to that of the modern day of the express-train and the aeroplane, with the stop-watch and the split-second chronometer.

The weight-clock, the spring-clock and the electrical devices for

regulating and setting clocks and watches at a uniform time, by both wireless and telegraph, will all be touched upon before the study is complete.

While studying the climate of Jamaica, the question was asked by the teacher, "Why is there more rainfall on the northern than on the southern side of the island?" An understanding of air movements was necessary to answer this properly.

Experiments—Wind.—Burning a candle underneath a raised glass funnel. Observing the direction of travel of the warm air. Observing convection currents by the radiator. Ventilating a room properly. Using a vacuum-pump to show pressure of air. General discussion.

Experiments—Condensation.—Boiling water in flask over Bunsen burner. Watching condensation on upper part of the flask. Holding cold Mason jar over flask mouth. Watching condensation. Meaning of vapor. Condensing vapor by passing cold water through parallel tubes. Boiling water with red rock salt in it. Condensing water—finding no salt, no color, in condensed water. General discussion of causes of rainfall and wind movement as indicated by these experiments.

As the journeys continue, frequent repetition of the principles of seasonal changes and wind movement, in explaining the climate of regions visited, is made. The pleasure of the class, in applying its new-found knowledge, seems to increase with use rather than to decrease. One child, in explaining the heavy rainfall on the eastern side of the Andes, in Peru and Ecuador, said: "My mother has been in the Himalayas, and she says there's an awful rainfall there. And I suspect, here in South America, it is something like that. You remember that experiment we had in the laboratory, showing that warm, moist air condenses when it comes into contact with any cold object—well, that's what causes the rain here in Ecuador and Peru. The warm, moist air, comes rolling in from the east" (*sweeping his hand across the Amazon valley*), "and when it tries to get over the Andes, it condenses."

The second geography journey starts in search of meat, with the questions: Why have we been asked to have a meatless day? Where does our own meat come from?

A trip to the Chicago Stock Yards is made. The lines of importation of cattle, sheep, and hogs into the city are found out; routes are traced up, and sources of supply discovered. An imaginary journey is then taken to the great plains, and westward to the irrigated alfalfa farms. A modern ranch is visited. Chief centers of packing other than

Chicago are visited; routes of shipment to eastern markets worked out. A shipment is followed to Europe. Chief centers of importation there are visited. Comparisons are made with other countries producing meat: Argentina, Chile, Brazil, Uraguay, Venezuela, Russia, India, Canada, Australia, New Zealand, and South Africa. The journey is then continued to Australia as a typical meat-producing country. While there, comparisons are made with the chief non-meat-producing countries, such as Japan and China, and those producing a radically different kind of animal—countries in the arctic regions.

The science problems for this work have been covered in the cacao journey. A review of principles with different application is all that is necessary. This part of the geography work is developed in the spring quarter, and the time given up to indoor experimental science is now transferred to the garden, the real nature laboratory.

GARDEN WORK (*Agriculture*)

The child's motive for having a grade garden this year is to aid in the conservation movement, hence all planting is to be vegetables. The outline of the work is as follows:

(a) SEEDS TO BE USED.—What vegetables are best suited to the garden space? Of these, which shall be planted so that the ground may be producing from spring to fall frost? Study of seeds, bulbs, and tubers; study of roots; study of difference between roots, bulbs, and stems.

Final selection of radishes, lettuce, and onions for early garden; these to be harvested before close of school. Then beets, carrots, parsnips, parsley, and horse-radish to be planted in the same space. The second planting will grow with little care during the summer when school is closed, and will be ready for harvesting in October.

(b) SOIL.—What kind of soil is in the garden plot? Is it ready to be used. What is soil?—surface soil, sub-soil? Of what is soil made?

These questions are answered by a review of work done during the preceding fall, when soil was examined and analyzed for window-boxes for the fourth-grade room. The work then given was as follows:

Composition of soils.—Mineral and vegetable matter? What is humus, sand, loam, clay, iron, lime? From where does the soil get these elements?

Experiments—Mineral Study.—Making limestone by means of shells sunk in lime. Examining beach pebbles. Examining sand. Making iron oxide.

The difference between limestone, sandstone, and granite was brought out in this work. One child wanted to know about igneous rocks, so a general discussion of volcanoes and their action ensued. Much interest centered in Vesuvius. Pumice, ash, lava, were examined. Then an artificial volcano was made in the laboratory, using a pile of sand, gas, and

A BUSY MORNING IN THE WAR GARDEN

compressed air. This lesson was followed by stereopticon views of active, dormant, and extinct volcanoes.

This work in soils is reviewed in the spring quarter, with the additional experiment of testing the garden soil for humus and comparing it with leaf-mold, loam, open field soil, and lake sand.

Experiment—Humus Content.—Dry thoroughly samples of five soils to be tested: leaf-mold, loam, soil from open field, lake sand, garden soil. Take equal amounts of each; place in tins, heat red hot in the furnace. Weigh after burning. Note observations as to weight of ashes. Draw conclusions. Bottle samples of soil before and after baking.

Experiment—Water Content.—Fill five glass tubes, stoppered at lower end with notched cork, with five kinds of soil, one kind to each tube. In a sixth tube, place dry, pulverized leaves. Have equal weight in each tube. Pour in water from measuring-glass slowly. Note amount of water absorbed before water begins to run out at bottom. Chart observations. Explain film moisture or capillarity. Call attention to dry farming principle.

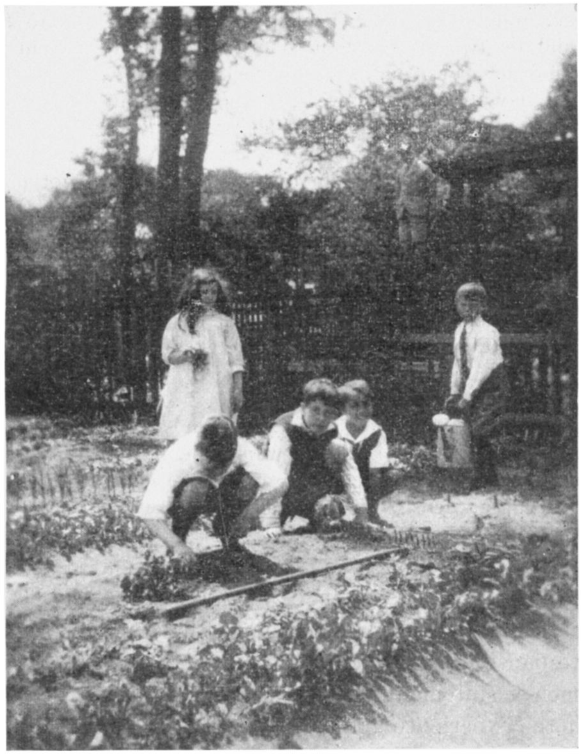
From the above experiments, draw conclusions as to needs of garden soil.

(c) FERTILIZERS.—Why are fertilizers used? How are plants fed? What are the chief plant foods? What are the chief fertilizers used?

Experiment—Fertilizer.—Making fertilizer from strong lye solution and meat bones brought from home. How should fertilizers be applied?

(d) WORKING THE SOIL.—Spading, pulverizing, raking, applying fertilizer.

(e) PLANTING.—Making rows; determining depth of planting (onion seeds and onion sets), thickness of planting, compact or light covering.



HARVESTING THE FIRST VEGETABLES

(f) CARE.—Keeping the soil loose; sprinkling (amount and frequency); thinning; weeding. Charting weeds that are troublesome. Watching for noxious insects; noting appearance, habits, destructive qualities, and means of elimination. Gathering of vegetables and disposing of them (exception onion sets). Cleaning of garden ready for second planting. Planting beets, carrots, parsley, horseradish. Contrast depth of planting with earlier vegetables. Why should this be so? Making arrangements for care during summer.

The affection bestowed by the grade upon this war-garden is evidenced by the following writings from the class.

WAR GARDENS

The fourth grade is making a war-garden. The garden is out where the swing used to be. We have planted radishes and beets and onions and lettuce. In the garden there are fourteen small gardens, and two people

work in each one. The way we planted our garden was to take a piece of string and tie two sticks on it, one on each end; we put these sticks in the ground to mark our rows. Then we planted our seeds. When we got through with one row, we took the sticks out and put some other sticks in. These sticks had no string between them. We put them there so that we could tell where we had planted. We planted our lettuce in flower-boxes on the window sill in our room. When it got big enough to transplant, we put it out in the garden. *Warwick.*

* * *

To transplant the lettuce in the garden, we used this method: we took a piece of wood, pointed at one end, and we hit it with a brick to make a hole about one inch. The holes we made two inches apart. After the plants were in the holes, we pressed the ground around them, and then we watered them. *Pauline.*

* * *

We are trying to do our bit in this war as much as we can. The government is asking us to plant a war-garden. The farmers are at the job, working harder than ever. Many of us are going to stay after school and work on our gardens. We want success in our gardens.

Wilhelmina.

GRADE PETS

From the care of pets, there come a breadth of sympathy and a sense of responsibility toward living things which no one questions. In fact, such a statement is itself trite in the light of recent school work. But the experience gained by the fourth grade the present year in animal husbandry and aquatic life has been a little unusual. It has, on the whole, been tragic.

In the fall of the present school year, the aquarium was thoroughly cleaned and prepared for three goldfish, a turtle, and a mud-puppy. The means by which fish breathe, and the fish's need for oxygen, were observed. Hence the necessity of keeping fresh water in the tank was duly appreciated. However, a violation of the rule not to overfeed the fish resulted in the death of two; then a sympathetic member of the class replaced these by two others. Later, an undiscovered trouble with the automatic supplying of the water caused the death of the three remaining fish. The mud-puppy and the turtle survived. The class immediately scrubbed the aquarium with Dutch cleanser and sterilized it with boiling water. At the present writing, the aquarium is ready for its new occupants—types of spring swamp life.

The following paragraphs, written by members of the class, will give the attitude of the class toward their aquatic experiences.

THE AQUARIUM

Once upon a time, the fourth grade had some fish, but I am sorry to say that the fish we had once upon a time are all gone, every last one—yes, every last one. But we are getting along pretty well. Dr. Lukens has given us some snails and snail eggs, and some leeches, and one of the boys has given us two turtles, and we think we will get some tadpoles. So you see, we are not so bad off after all. *Willard.*

* * *

We had some fish, but they did not like us, the water, or the room, so they said they would not live with us, and died. *Frederick.*

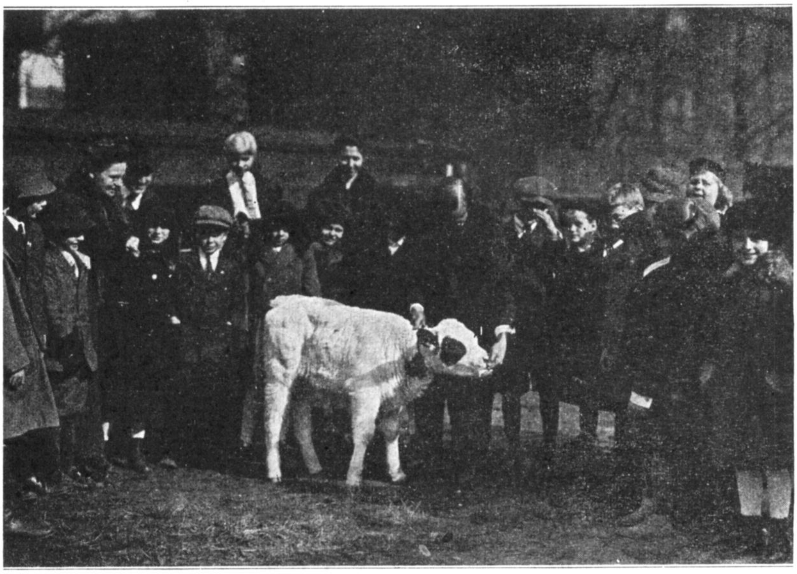
* * *

The animal husbandry was equally tragic. In the fall a calf, six weeks old, was given to the class. Many hours of manual-training work, in school and out, were necessary to the getting in order of the little barn and runway. Many examples in arithmetic developed in measurements. Short English lessons arose from the telling of the work. Unfortunately, the calf arrived at school at the time the milk famine arrived in Chicago. The calf demanded three gallons of milk a day—such a quantity was not to be had during the shortage. Cream was one day resorted to; evaporated milk another day. A careful mathematical computation by the class convinced the children that, as one member wittily put it, the calf was going to bankrupt the class. So he was sold after three weeks' ownership. But his price did not balance the milk account. However, much valuable information, as to how to feed a calf and what to feed, was obtained by the children. Also, good observational work was done in reading the thermometer when testing the temperature of the milk and water.

The Angora goat, which came later to take the place of the calf, required little care. Water, tested by the thermometer, was given him daily. Alfalfa was kept fresh in his box, and salt was tucked away in a corner of his stall. But one cold February morning, he broke the gate of his runway and disappeared! The story of these two pets was told by a member of the class in the following paper:

ANOTHER SAD PET STORY

The fourth grade of 1918 was very fortunate to get a gift of a pet calf. The calf was presented by Mrs. Seaman, but he drank so much milk a day that we decided to give him back. Mrs. Seaman said that she *gave* him to us. So we sold him. Even then he didn't pay for the milk he had drunk. "Next," said the fourth grade, and "next" did come. Russell Olson, being still fond of animals, brought us a goat. It was a cold winter morning, and snow was on the ground—we found the goat was



A BEAUTIFUL BUT EXPENSIVE PET

gone! Our teacher said when she was on the bus she saw a goat, but did not think it was ours. When we found it was ours, we went out to the goat-house, found its tracks, and traced it to the park. There we lost its tracks. Several times boys went out and tried to find him, but couldn't. We notified the police. A policeman chased him down to Chicago Avenue, but there lost him in an alley. Gone! And he'll never come back.

Frederick.

READING LIST

Book of Knowledge, Mee and Thompson..........*(Educational Book Co.)*
Tropical Reader, Blackie............*(Blackie and Son, Ltd., London, Eng.)*
North America, Reader by Carpenter..................*(Amer. Book Co.)*
South America, Reader by Carpenter....................*(Amer. Book Co.)*
How the World Is Fed, Reader by Carpenter.............*(Amer. Book Co.)*
The Continents and Their People, R. T. Chamberlin...........*(Macmillan)*
How We Are Fed, R. T. Chamberlin........................*(Macmillan)*
Geography, Brigham and McFarlane..............................*(Ginn)*
Geography, Tarr and McMurray............................*(Macmillan)*
Encyclopedia Britannica.
Burton Holmes' Travel Books.
National Geographic Magazine.
Popular Science Monthly.
Pan-American Union.
Steamship and Railroad Folders.